Zooarchaeology of Mission Santa Clara de Asís: Bone Fragmentation, Stew Production, and Commensality

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Abstract

Through the analysis of faunal remains from refuse features associated with the Native Californian living quarters at Mission Santa Clara de Asís, the article examines Indigenous diet within this colonial mission settlement. In Alta California, Native Californians from differing sociolinguistic groups were relocated to Spanish missions, creating an ever shifting pluralistic society. Within these mission settlements, Native Californians were tasked with maintaining the vast agricultural fields for which they received ingredients for two Spanish-style meals, *atole* and *pozole*. This study examines the diet of Native Californian families living within Mission Santa Clara, specifically focusing on the breakage patterns of cattle bones and the communal preparation, cooking, and consumption of these daily meals. These results illustrate change and continuity of foodway practices, expanding our understanding of mission political economies and Native Californian persistence within this colonial system.

Keywords Zooarchaeology · Spanish colonial · Native American · Colonialism

Introduction

The Spanish colonization of Alta California began in the late eighteenth century, resulting in the establishment of 21 Franciscan mission complexes lining the coast from modern-day San Diego north through San Francisco. The overall goal of this colonial endeavor in the west coast was to create self-sufficient settlements through the labor of missionized Native Californians, while transforming the local populations into Christian, Spanish subjects loyal to the crown. Each mission settlement as well as adjacent presidios and pueblos were reliant on the products from European-style agriculture introduced to Alta California. Specifically, Iberian cattle were at

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the center of this economic system, with mission complexes dependent on profits derived from selling tallow and hide. Yet, while Spanish Franciscan padres operated these mission settlements, it was the solely through the labor of missionized Native populations that this economic system existed.

In recent years, archaeological research of Spanish colonial sites has challenged past assumptions regarding the acculturation and assimilation of Native Californian populations (see Allen et al. 2010; Brown 2018; Lightfoot 2005; Panich 2013, 2014; Panich and Schneider 2015; Pavao-Zuckerman and LaMotta 2007; Popper 2016; Reddy 2015; Silliman 2009; Voss 2015). Investigations at mission sites within Alta California have assessed the changes and continuities of Native Californian populations with ample evidence for the persistence of traditional practices throughout the Mission Period. In this contribution, I provide an evaluation of the daily dietary practices of Native Californians living at Mission Santa Clara, focusing specifically on processing, cooking, and consumption practices of Iberian cattle. Mission Santa Clara de Asis was established in 1777 in the southern portion of modern San Francisco Bay, the first mission complex erected by the Spanish Franciscans in the homeland of the Tamien Ohlone. During its occupation, Mission Santa Clara eventually housed a shifting pluralistic population comprised of Ohlone, those who spoke the Yokuts language as well as interior Miwok people (Allen et al. 2010).

Following an overview of the historical background of the Spanish mission system in Alta California and Mission Santa Clara de Asis, I present an analysis of the faunal remains from three refuse features excavated within the *Ranchería* which housed married Native Californian families. This analysis suggests that within the confines of Mission Santa Clara, cattle were the primary meat consumed by Native Californian families within the *Ranchería*, aligning with previous zooarchaeological research at Alta California missions and presidios (see Farris 1991; Gust 1982; Langenwalter and McKee 1985; Romani and Toren 1975; St Clair 2005; Walth 1990). However, the heavy fragmentation of large mammalian (c.f. cattle) remains throughout the Mission Period suggests Native Californians practiced marrow removal and grease rendering. Rather than a defined step in the preparation of Spanish-style meals, the extraction of marrow and grease from large mammalian bones has been well documented prehistorically in much of California (Arkush 2011; Collins 2010; Pavao-Zuckerman 2011; Sunseri 2015). I therefore argue this type of processing represents a rearticulation of pre-contact practices within this colonial setting. Rather than evidence of passivity or social cleavage, marrow and rendering grease illustrate a continuity of precontact practices.

Ethnographic evidence integrated with this zooarchaeological analysis reveals that cattle meat was eaten within Spanish-style stews (Duhaut-Cilly 1999; Langsdorff 1814; Pinedo 1934). Although stews were cooked using Spanish ingredients, large cauldrons positioned within the *Ranchería* were used to communally prepare, cook, and consume daily meals, with the stews shared amongst many. Commensality, or the shared activity of cooking and eating, creates a space within a colonial setting where new social bonds could be formed, and older bonds solidified (Pollock 2012). Commensality is far more than just the physical act of eating and drinking together, the shared practices instead creating and fortifying a sense of community (Pollock 2012: 9). The social importance of daily diet lies not in the foods eaten,

but in the shared and daily practices through which foodways-related activities form and communicate social relations between people. It is important to acknowledge that although individuals from different ethnolinguistic and cultural affiliations of Ohlone, Yokut, and Miwok were brought to live within the boundaries of Mission Santa Clara and *Rancheria*, the formation of a singular ethnic group of Native Californian did not occur (Panich et al. 2018). Indeed, descendants continue to identify with precontact polities thus confirming ethnogenesis or the formation of a new cultural group did not occur. The employment of the framework of commensality thus refers solely to the preparation and consumption of Spanish-style meals and does not extend to the persistence of traditional foodways that occurred throughout the mission period.

The Spanish Mission Period

Following the founding of the first Spanish colonial town of St. Augustine in La Florida in 1565, the Spanish expanded westward, with new missions established along the growing frontier. This imperial expansion has been described as “simultaneously an invasion, a colonization effort, a social experiment, a religious crusade, and a highly structured economic enterprise” (Deagan 2003:3). Alta California was the final frontier of Spain’s colonial expansion in North America, developing northward from missions established in Baja California. The Mission Period began in Alta California in 1697 with the establishment of Nuestra Señora de Loreto by Spanish Franciscan padres. Led by Junipero Serra, Spanish Franciscans rapidly expanded north, founding 21 missions that dotted the coast from modern-day San Diego up through San Francisco.

The purpose for establishing the mission system in Alta California was three-fold. First, the Spanish crown aimed to colonize Alta California to halt the colonial expansion of both the Russians and the English. Russian fur traders had begun to venture south from modern-day Alaska while early English claims to the territory were surfacing, threatening Spanish expansion. Second, differing from the aspirations of other European powers vying for control of North America, Spain sought to incorporate local native populations within its new society. The policy of *reducción* ordered Spanish soldiers and Franciscan padres to relocate seasonally mobile Native Californians into single, centralized sedentary missions with the intention to transform the Native populations into *gente de razón*, or people of reason (Lightfoot 2005:65; Margolin 1989:33). The goal of this endeavor was to produce a population of Christian, Spanish citizens loyal to both the crown and its expanding empire. Third, each mission was designed to be semi-autonomous and self-sufficient through the creation of agricultural fields focused on European-style farming. To effectively manage these fields, the Spanish conscripted baptized Indigenous men into a labor force in order to establish and maintain self-supporting agrarian communities (Costello 1975; Deagan 2003; Lightfoot 2005; Panich and Schneider 2015).

The Spanish colonial enterprise undertaken in California was comprised of mission complexes, presidios (military outposts), and pueblos (towns) for Spanish citizens. In the original strategy for the mission system in Alta California, missions,

pueblos, and presidios supported and relied on the Kingdom of New Spain, created from the remnants of the Aztec Empire, with the intention to promote the expansion of Spanish colonial endeavors (Hackel 1997). Settlements in Alta California relied on these supply ships through the early mission years until the Mexican War Independence in early nineteenth century caused communication and support with Spain to become increasingly sporadic (1805–20). To compensate, Alta California missions began to trade surplus goods to local Spanish pueblos and presidios. Although each of the three independent institutions were entangled in the colonial system, the missions themselves quickly came to form the economic base in the form of food, supplies, and labor. As communication with Spain continued to diminish through the nineteenth century, settlements in Spanish California's quickly came to rely on foreign markets for the sale of their surplus goods. Though prohibited by Spanish law, trade with British and Russian assisted Spanish missions in obtaining imported necessities. This economic outlet led to an increase in the specialization of manufactured goods as foreign companies vied for access to California's hide and tallow industry (Hackel 1997).

In 1821, Mexico successfully ceded from Spain and acquired the expansive Alta California colonial system, initiating what scholars refer to as the Mexican Years (Jackson and Castillo 1995:98). This transition of power had an overarching influence on the Spanish mission system, solidifying the transition of these institutions from social to economic organizations. While Spanish rules for managing the missions detailed in *informes* were no longer enforced, for Franciscan priests and Native Californians alike, everyday life within each mission complex changed little (Skowronek et al. 2006).

The continued commercial success of the missions brought them under the scrutiny of the growing Mexican civilian population in California who coveted the fertile land. In 1833, Mexico passed the law of secularization, thus privatizing all 21 mission settlements, permanently ending the Alta California mission system. The secularization of the missions from 1834 to 1836 progressed haphazardly. Military settlers and migrants from Mexico received preferential land allotments despite original promises of equal distribution between colonists and Native Californians (Voss 2008:107). Through the following decade, the owners of the land allotments continued to partake in the lucrative hide and tallow trade, with many Native Californians remaining to work within the newly formed ranchos. Nevertheless, the resident mission population declined until by the early 1850s, only a few hundred Native Californians were recorded within the boundaries of missions, with additional populations continuing to live in adjacent lands (Skowronek 1998: 295).

Economy and Diet of Alta California Missions

The economies of California missions primarily relied on market commodities derived from cattle, specifically tallow and hide (Dallas 1955; Dietler et al. 2015: 34; Farnsworth 1987; Gust 1982; Langenwaller and McKee 1985; St. Clair 2005). Iberian cattle were first introduced into California by the Spanish colonists by way of Mexico and Baja California (Gust 1982). Dissimilar to other regions within the

Spanish colonial lands such as La Florida, cattle thrived in the semiarid grasslands of Alta California. Populations quickly swelled after their introduction, providing sufficient meat and other animal products for people living at the missions, local presidios, and pueblos (Costello 1990). The high quantities of meat effectively rendered these settlements largely independent from Spanish supply ships. Such was the reliance on cattle rather than other Eurasian domesticates, that by the beginning of the nineteenth century, the primary exports from California missions were hide and tallow (Burcham 1961; Geiger and Meighan 1976; Gust 1982; Robinson 1947; Wessel 1980).

The butchery of upwards of 150 cattle occurred on a weekly basis, while larger slaughters known as *mantanza* took place in the summer months (Gust 1982). *Mantanza* specifically allowed for the mass production of hides and tallow. This Spanish-colonial butchering practice named “Californio” style has been well documented in both historic and archaeological research (Gust 1982). Following the weekly or seasonal corralling and killing of the cattle, cleavers were used to divide the carcass (Gust 1982; Langenwaller and McKee 1985; Smith-Lintner 2007; Walker and Davidson 1989; Wessel 1980). After meat was stripped from long bones to make jerky, hides and fat were acquired to make leather and tallow respectively. Vertebral and rib elements, which are notably difficult to strip meat from, were segregated from this butchering process and instead reserved the daily meals of *atole* and *pozole* (Gust 1982; Langenwaller and McKee 1985; St. Clair 2005; Walker and Davidson 1989).

The productivity of the Alta California mission economic system was founded in the formation of an agrarian work force comprised of relocated and baptized Native Californians (Hylkema 1995; Lightfoot 2005). While the nature of this workforce varied across missions, this employment of Native Californians was decidedly exploitative, with Indigenous people utilized as an inexpensive labor force (Lightfoot 2005). In return for their labor, which kept the mission system functioning, Native Californians received material goods, housing, and weekly food rations for daily meals.

The agricultural diet introduced by the Spanish was a sharp departure from previous Native Californian foodways focused on harvesting aquatic resources, gathering plants, and hunting animals. Following their inclusion into Alta California missions, historical documents detail that Native Californians were given weekly ingredients for three daily meals of *atole* and *pozole*. The meals of the Spanish colonists in Alta California were not really Iberian, but rather an amalgamation of Iberian, Mesoamerican, and African, developed from the prolonged years of contact and interracial marriage. The morning and evening meals called *atole* were grain soups, while lunch was a thick-broth soup or stew *pozole* made from vegetables and meat (Lightfoot 2005:60; Mora-Torres 2005; Webb 1952).

This article joins a growing body of zooarchaeological research focused on daily diet within the California mission system, including Mission San Antonio de Padua (Langenwaller and McKee 1985), Mission Vieja de la Purísima (Gust 2004), Mission San Luis Obispo (Gust 2006), Mission Santa Cruz (Allen 1998), Mission San José (Panich et al. 2018), Mission San Juan Bautista (St. Clair 2005), and Mission San Buenaventura (Romani and Toren 1975). A large percentage of

assemblages associated with Native Californian residential areas are composed of primarily cattle remains, indicating their importance in Spanish-style meals. Other Eurasian domesticates (sheep, goats, and pigs) occur less frequently, and are rarely an integral component of daily meals. While Native Californians living within mission settlements adopted some aspects of colonial cuisine, faunal assemblages from numerous Spanish missions have also demonstrated wild food resources were consistently acquired and eaten throughout the Mission Period (Allen 1998:42; Panich et al. 2018; Popper 2016; Smith-Lintner 2007; St. Clair 2005).

Mission Santa Clara de Asís

Mission Santa Clara de Asís was founded in January 1777 in the southern portion of the San Francisco Bay within the homeland of the Tamien Ohlone (Fig. 1). In the early years, the mission housed primarily Ohlone peoples from surrounding villages (Skowronek 1998). In the early 1800s, people who spoke the Yokut language from the San Joaquin Valley joined Ohlone people within the Mission (Milliken 1995:110). The relocation of more than 1,800 Yokuts ended following the Estanislao resistance of 1828–29, when Native Californians revolted against Mexicans in the San Joaquin Valley. This prompted the recruitment of Miwok peoples from the Sierra Nevada foothills, who were brought into the mission in smaller numbers until

Fig. 1 Ethnolinguistic borders of Ohlone, Yokuts, and Coast Miwok, adapted from Panich and Schneider (2015) and Muwekma Ohlone Tribe of the San Francisco Bay Area (2015)

secularization in 1836 (Milliken 2002:60). The pluralistic Indigenous population at Mission Santa Clara is not unique in Alta California, as many missions housed peoples from numerous cultural and linguistic groups. Mission Santa Clara is best understood as housing a continuous but shifting mix of Indigenous Californians from a territory encompassing lands spanning the San Francisco Bay Area to the San Joaquin Valley.

Skowronek and Wizorek (1997) refer to Santa Clara as a “Moveable Mission” as flooding and earthquakes necessitated the relocation of the mission church and quadrangle, eventually creating five iterations of the mission complex. In 1779, just two years after the church, sacristy, and habitation rooms were constructed, this first manifestation of Mission Santa Clara was destroyed in a flood. That same year, a temporary church and habitation rooms were constructed in the typical quadrangle formation (Spearman 1963: 20). In 1784, construction was finished on a third permanent church of Mission Santa Clara (Skowronek and Wizorek 1997: 61). Construction continued on this new location for the mission quadrangle for the next 35 years until two earthquakes—one in 1812 and another in 1818—levelled these structures (Skowronek and Wizorek 1997: 63). During construction of the final quadrangle, a temporary fourth church was quickly erected. The fifth and final church was

Fig. 2 Map of excavations at Mission Santa Clara

built in 1825 after the completion of the quadrangle (Skowronek and Wizorek 1997: 70). Following secularization and abandonment, the sixth and current church was rebuilt in the location of the fifth in 1928.

Although the quadrangle and church were moved several times, the *Ranchería* remained in a single location throughout the Mission Period, located northwest of the third and fifth mission complexes (Fig. 2). The *Ranchería* was a small settlement just outside the mission comprised of adobe barrack style housing alongside Native-style dwellings that housed married, baptized Native California families. Young girls, unmarried women, and widows were housed in special dormitories within the quadrangle itself, while boys and unmarried men were housed elsewhere at the mission (Skowronek and Wizorek 1997).

Ethnographic accounts state that Mission Santa Clara was one of the largest and richest missions in Alta California, with fertile soils, numerous buildings, and expansive areas for cultivation. Vancouver (1954:226), who visited in 1792 noted that of the Alta California missions, Mission Santa Clara boasted some of the best soils, allowing for greater yields than neighboring missions. The high productivity of Mission Santa Clara is observed throughout the Mission Period through sequential visits from European explorers (Beechey 1831; Duhaut-Cilly 1999; Robinson 1947). Indeed, reports from the early 1800s state that due to increasing size of cattle herds, the practice of culling was instituted to minimize overgrazing (Duhaut-Cilly 1999, 2:237; Robinson 1947:59–61). Upward of 150 cattle were slaughtered each week, processed primarily for their hides and tallow meat reported having been wasted (Duhaut-Cilly 1999:237). According to Franciscan priests, allocating cattle meat to soldiers and selling the tallow and hides (rather than cattle) would have been more profitable, but this was forbidden as prices were established and enforced by the Spanish crown (Archibald 1978:25). However, even following the shift in power as Mexico gained control of the Alta-California mission system, Captain August Duhaut-Cilly (1999:130), who visited in 1827, stated “the padre was killing one hundred fifty cow each week for hides and tallow. Part of the meat was dried and made into tasajo or jerky beef, but most was wasted.”

As at other Alta California mission, Ohlone, Northern Valley Yokuts, and people from interior Miwok groups were all incorporated into an agrarian labor force. Days consisted of meals, work, prayers and mass, the routinization of the schedule strictly enforced. This labor system was inflexible, with long hours worked six days a week which outwardly aimed to indoctrinate Native peoples and transform them into productive subjects of the Spanish Empire. Although the productivity of Mission Santa Clara’s agricultural fields was solely attributable to the labor of Indigenous men, it was the Franciscan padres who controlled the harvests and allocated rations for daily meals (Skowronek et al. 2006:16). Otto von Kotzebue (1821:281–282) of the Imperial Russian Navy wrote of his travels in the early 1800s, stating that while “men cultivate the ground: the harvest is delivered to the missionaries and stored in magazines; from which Indians receive only so much as is necessary for their support.” Indeed, in 1827 Duhaut-Cilly (1999:129) witnessed a “grain harvest, a time of joy and gaiety in the fields of France, but no such sentiment of this kind was visible on the faces of the Indians occupied in this work. It is very simple: whether they

harvested a little or much, they would have their daily pittance, and it meant nothing to them that there might be something left over.”

Ethnographic documents are vague in terms of the weekly food resources Native Californians received. Franciscan reports and European explorers who visited Santa Clara state Native Californians were given cattle meat as part of their rations but fail to specify the quantity or quality (Duhaut-Cilly 1999; Langsdorff 1814; Pinedo 1934). Only von Kotzebue (1821:95–96) notes that for Native Californians, “their ordinary and not very wholesome food consisting of wheaten flour, maize, peas and beans, mixed together and boiled to a thick soup.”

While the quality and quantity of rations were not well documented, the communal nature of the food preparation and daily meal consumption was noted by numerous visitors throughout the occupation of Mission Santa Clara. Each day within the *Ranchería*, Native Californians prepared three colonial meals of *atole* and *pozole* using the food received as payment for their daily labor (Pinedo 1934:9–10). At the scheduled times, a bell was rung, and each family was served their portion of the stews from the large, central kettles located within the *Ranchería* (Duhaut-Cilly 1999, 2:237; Langsdorff 1814; von Kotzebue 1830; Pinedo 1934). Notably, even as Native Californians from differing sociolinguistic groups were introduced into the Mission, three meals continued to be communally prepared and eaten, shared among all the families residing within the *Ranchería* (Langsdorff 1814; von Kotzebue 1830:95–57; Pinedo 1934:9–10), who visited the mission in 1825, expressly describes “a large yard or square in the *Ranchería* and in the center of that square were furnaces upon which were placed great cauldrons to cook the food which was eaten right there.”

Previous Work at Mission Santa Clara

In the late nineteenth century, the Society of Jesuits established Santa Clara College, precursor of Santa Clara University, within the historic boundaries of Mission Santa Clara de Asís. As the University has expanded over the last century, construction projects have fueled the exposure and excavation of numerous intact features that exist across the campus. The long history of archaeological work conducted on Mission Santa Clara provides essential foundational knowledge concerning both the layout of mission buildings and the daily lives of the residents living within the boundaries.

The third Mission site (1781–1818) is well documented historically and archaeologically, with numerous university and city projects exposing much of the third mission complex. Early excavations in the early and mid-1900s on Franklin Street uncovered both adobe walls and burial sites associated with the third mission (Lynch 1981:12). Later, in 1981, extensive testing and excavation revealed much of the third mission church and quadrangle alongside numerous intact deposits containing mission era artifacts (Mayfield et al. 1981). This archaeological work on the third mission site continued throughout the 1980s, identifying the location of tanning vats and drainage ditches alongside mission-era refuse pits (Huelsbeck 1985, 1988, 1989). Based on this previous research, an archaeological preserve designed

to prevent additional destruction of the third mission site was erected (Hylkema 1995). In comparison, archaeological work associated with the fourth (1818–22) and fifth mission (1822–1926) compounds is less abundant. Currently, the few construction projects on Santa Clara University's campus conducted on the fourth and fifth mission complexes have uncovered architectural footprints and associated domestic refuse features (D'Oro et al. 2011).

Additional projects have uncovered numerous components of the Mission built landscape, including orchards and associated adobe walls, livestock corrals, or irrigation canals. Notably, construction of a parking garage in 1999 uncovered a shallow wide pit that had been utilized as a large butchering area known as a *mantanza* (Burson 1999). In the sample analyzed from this butchering location, a high quantity of bone was uncovered, estimated at over 1,500 cattle. Complete skeletons were identified devoid of butchery marks representing food processing practice, instead indicating cattle were killed and butchered for their secondary products of tallow and hide (Burson 1999: 2).

More recently, archaeological investigations for university construction projects have unearthed the spatial footprint of the *Ranchería* (Allen 2010; Allen et al. 2010; Garlinghouse 2009). Located to the north of the third, fourth, and fifth church complexes, the *Ranchería* was occupied throughout the Mission's existence. Presently, only one mission-era structure remains in the *Ranchería*, the Santa Clara Woman's Club Adobe, which historically had eight adobe rooms for families. Portions of adobe barracks have been excavated, aligning with the historic records that document layout of the *Ranchería* (Beechey 1831). In addition to the adobe barracks, Native-style pithouse was also unearthed, suggesting Native Californians lived in their traditional dwellings as well as adobe buildings (Allen and Blount 2009).

Excavation—Franklin Block 448

This article focuses on faunal remains recovered from a multiyear excavation for proposed construction of a parking garage and Art and Art History building located on Franklin Street on the northside of campus. This project, named Franklin Block 448, was situated on the site of the third mission church and associated quadrangle and *Ranchería*. Following the demolition of modern buildings, the entire project area surface was cleared using a backhoe, allowing for the complete identification of cultural deposits. Features identified include circular wells and privies that, following abandonment, were filled with Mission Period refuse, hearth features, storage pits, architectural features including pit houses and adobe structures, and communal refuse features (Allen et al. 2009; Peelo et al. 2011). Excavation concentrated on deposits that would be most impacted by the construction. Of the 94 culturally significant features dating to the Mission Period, 30 were left intact while 64 were either partially or completely excavated (Hylkema and Blount n.d.).

From the features identified within the Franklin Block 448 project, communal refuse pits 196, 176, and 194 were chosen for this study. The three communal refuse features were located within the *Ranchería* and associated with the adobe housing complex, suggesting the faunal remains represent consumption activities and daily

diet of Native Californians. As shown in Fig. 2, features 194 and 196 were located just north of the adobe barracks while feature 176 was located between two residential structures. Based on associated artifacts excavated and ethnographic material, a clear chronological sequence was generated: (1) Feature 196: 1777–early 1800; (2) Feature 176: 1800–early 1820s; (3) Feature 194: early 1820s–36 (Hyklema and Blount n.d.). The dates of the three features together span the entire Mission Period, allowing for an examination of diet from the founding of the mission through to secularization. While additional features were identified within the *Ranchería*, many either did not relate to foodway practices or were utilized for shorter lengths of time.

Following feature identification, the boundaries of features 196, 176 and 194 were defined and each level was bisected, allowing for profiles detailing the stratigraphy of the various contexts. Excavation revealed distinct multiuse pits, or “sub-features,” including an American Period intrusion that postdates secularization. Sub-features were assigned phase numbers (Phase I, Phase II, Phase III, and Phase IV) that relate to different filling episodes. Each level within the three features was wet-screened through 1.6 mm (1/16th in) mesh, allowing for the recovery of smaller artifacts, including bones.

Methods of Analysis

All zooarchaeological identification and analysis was conducted at the University of California, Santa Barbara and Los Angeles Zooarchaeology Laboratories with the assistance of Dr. VanDerwarker and Dr. Wake, utilizing comparative skeletal collections. This analysis adds to previous zooarchaeological work that has been conducted in other contexts at Mission Santa Clara (Allen et al. 2010; Garlinghouse 2009; Kiel 2016).

All bones and bone fragments from the three contexts were analyzed macroscopically and identified to the most specific taxonomic category when possible. The majority of ribs and long bone shaft fragments were assigned to categories of “Large Terrestrial Mammal” or LTM (cattle or horse), “Medium Terrestrial Mammal” or MTM (sheep, goat, or deer), and “Small Terrestrial Mammal” or STM categories. Following taxonomic classification, I conducted a preliminary analysis of the faunal remains that recorded information related to the elements’ side (when applicable), portion, length, fusion status, burning, and any indication of gnawing and butchery. Age-at-death estimates for cattle bones were determined through examination of long bone epiphyseal fusion (Schmid 1972; Silver 1970).

Measures of relative abundance calculated include the number of identified specimens (NISP), normed NISP (NNISP), the minimum number of elements (MNE), and biomass. NISP is a simple tally of the number of specimens recovered from various taxonomic categories. NNISP was calculated by dividing NISP values by the number of times elements occur in the skeleton. This metric is used to combat the high quantity of fragmented vertebrae, which inflate counts of NISP. MNE estimates the number of skeletal elements in a faunal assemblage, determined by counting the percent of portion of elements and focusing specifically on diagnostic features.

Biomass is an estimate for the amount of meat associated with a bone derived from measures of the weight of a bone (Reitz et al. 1987; Reitz and Wing 1999: 211).

Modifications examined include cooking and butchering methods, extraction of animal products such as marrow and grease, and natural processes, including weathering and rodent/carnivore gnawing. In terms of butchering marks, hack marks most commonly reflect the process of dismemberment, while cut marks can be produced during processes of both dismemberment and cooking. Spiral fracturing, which occurs when force causes a crack to wind around the bone to produce a helical break, was also identified (Gifford-Gonzalez 2018: 213). Although there is evidence that this type of breakage can occur through natural means such as trampling, the method was also a common butchery technique used by Native California and other foraging groups (both ancient and modern) for the purpose of marrow extraction (Lyman 1994). Thermally modified bone indicative of intensity and intentionality of burning from cooking and/or disposal practices were identified following Munsell soil color charts (Munsell 2010).

Results

This faunal assemblage from these three contexts at Mission Santa Clara is considerable and includes 26,645 specimens (Table 1). Mammalian bones are the most abundant in each feature and dominate both measures of both count and weight. The percentage of NISP and derived biomass estimates has been calculated for all zooarchaeological remains that were able to be identified to at least the taxonomic level of Order, thus excluding unidentifiable bone fragments (Figs. 3 and 4). The identified taxa are summarized in categories of domestic and wild mammals, birds (wild and domestic), and reptiles. Wild and domestic birds are grouped together due to the identification of solely two domestic chicken bones, with the remaining bones from wild birds. While low in overall biomass, wild mammals contribute the largest proportion to NISP in each feature, confirming that Native Californians continued hunting throughout the Mission Period (Figs. 3 and 4). Despite this continued practice, biomass estimates demonstrate the primacy of meat from domestic livestock in the daily diet of Missionized Indigenous groups.

Domestic Mammals

The remains of cattle elements are more abundant than those of any other animal domestic mammal in the Mission Santa Clara assemblage. Sheep and goat (caprine) bones were identified in low quantities in all three features. This differs from records that note higher numbers of sheep were kept at the mission, suggesting either Native American preferred beef or sheep herds were maintained for wool rather than meat (Allen et al. 2009: 106; Garlinghouse 2009; Kiel 2016). Both pigs and equids (horse, donkey, and mule) were absent from the collection, aligning with previous research

Table 1 List of identified taxa from Mission Santa Clara

Taxon	Context	196		176		194	
		NISP	Weight	NISP	Weight	NISP	Weight
Artiodactyl	Even-toed ungulate	11	20.55	3	6.14	15	5.12
<i>Bos Taurus</i>	Domestic Cattle	200	4260.49	105	1688.11	295	5507.52
Canidae	Dog or Coyote	0	0	9	2.29	29	22.52
<i>Canis lupus familiaris</i>	Domestic Dog	0	0	0	0	2	2.75
Caprinae	Domestic sheep or goat	33	49.74	14	29.97	14	26.86
<i>Cervus canadensis</i>	Elk	2	77.34	0	0	0	0
Felidae	Cat or fox	3	1.6	1	0.07	19	34.84
<i>Felis catus</i>	Domestic Cat	3	0	0	0.07	21	0
Geomyidae	Pocket Gopher	0	0	12	1.27	9	0.15
Leporidae	Rabbit/Hare family	1	0.24	6	0.24	0	0
<i>Lepus californicus</i>	Black-tailed jackrabbit	6	0.54	1	0.44	0	0
<i>Mephitis mephitis</i>	Stripped Skunk	0	0	0	0	11	3.48
<i>Neotoma fuscipes</i>	Dusky-footed woodrat	8	0.08	5	0.25	6	0.22
Neotominae	New World Rat	12	0.15	7	0.08	14	0.16
<i>Odocoileus virginianus</i>	White-Tailed Deer	22	6.93	9	22.47	22	35.2
Otariinae	Sea Lion	1	19.58	4	110.48	0	0
<i>Peromyscus</i> cf	New World Mice	27	0	2	0.02	16	0
<i>Peromyscus maniculatus</i>	Deer Mouse	13	0.55	0	0	9	0.34
Sciuridae	Squirrel	27	1.01	21	0.51	79	5.09
<i>Sciurus griseus</i>	Grey Squirrel	19	4.97	0	0	3	0.62
<i>Spermophilus beecheyi</i>	California Ground Squirrel	295	30.37	141	17.1	490	68.28
<i>Sylvilagus</i> sp.	Cottontail	8	1.56	9	0.97	3	0.4
<i>Urocyon cinereoargenteus</i>	Grey Fox	0	0	0	0	2	6.94
Identifiable Mammalia		691	4475.7	349	1880.48	1,059	5720.49

Table 1 (continued)

Taxon	Context	196		176		194	
		NISP	Weight	NISP	Weight	NISP	Weight
Indeterminate Mammalia		3779	1209.12	10,756	3844.56	8,064	2986.18
Total Mammalia		4470	5685	11,105	5725	9123	8707
<i>Anas</i> sp.	Anas	29	3.58	34	2.34	60	1.65
Anserinae	Anserinae	3	0.66	3	1.01	5	4.58
<i>Aythya</i> sp.	Aythya	2	0.2	0	0	0	0
<i>Tyto alba</i>	Barn Owl	1	0.05	1	0.14	4	0.32
<i>Branta bernicla</i>	Brant Goose	0	0	0	0	3	7.57
Icterid (<i>Euphagus cyanocephalus</i>) cf	Brewers Blackbird	2	0.02	3	0.15	2	0.01
<i>Gymnogyps californianus</i>	California Condor	4	9.34	0	0	0	0
<i>Branta canadensis</i>	Canadian Goose	18	11.07	15	13.78	41	27.28
<i>Bombycilla</i> cf. <i>cedrorum</i>	Cedar Waxwing	0	0	0	0	0	0.02
<i>Gallus gallus domesticus</i>	Chicken	2	0.22	0	0	4	2.46
<i>Anas cyanoptera</i>	Cinnamon Teal	5	1.02	11	1.7	8	1.89
<i>Anas carolinensis</i> / <i>cyanoptera</i> /discors	Cinnamon/green winged/blue winged teal	11	2.99	13	1.9	16	2.2
<i>Corvus corax</i>	Common raven	4	1.37	0	0	15	0
Scolopacidae	Common snipe	0	0	0	0	1	0
Phalacrocoracidae	Cormorant	1	0.08	0	0	0	0
<i>Corvus brachyrhynchos</i>	Crow	0	0	0	0	6	0
<i>Bucephala clangula</i> cf	Golden eye	7	0.97	4	0.62	2	0.3
Falconiformes	Hawk	0	0	0	0	9	0.3
<i>Anas platyrhynchos</i>	Mallard	17	6.65	16	4.56	18	3.64
<i>Anas acuta</i>	Northern pintail	2	1.05	35	8.21	8	5.12

Table 1 (continued)

Taxon	Context	196		176		194	
		NISP	Weight	NISP	Weight	NISP	Weight
Passeriformes	Perching bird	6	0.06	0	0	5	0
<i>Callipepla californica</i>	Quail	3	0.04	0	0	0	0
<i>Buteo jamaicensis</i>	Red tailed hawk	0	0	4	0.46	7	2.83
<i>Aythya collaris</i>	Ring neck duck	0	0	1	0.11	0	
<i>Charadrius nivosus</i>	Robin	0	0	3	0	0	0.01
<i>Oxyura jamaicensis</i>	Ruddy duck	13	1.45	5	0.77	10	3.97
<i>Oxyura cf. jamaicensis</i>	Ruddy duck	5	0.21	1	0.06	8	0.87
Calidris	Sandpiper	2	0	3	0.4	4	0.15
<i>Melanitta</i> sp.	Scoter	0	0	1	0.27	2	0.22
<i>Melospiza melodia</i> cf.	Song sparrow	6	0.06	0	0	0	0
<i>Calidris cf. mauri</i>	Western sandpiper	2	0.02	0	0	0	0
<i>Aix sponsa</i>	Wood duck	2	0.15	9	1.92	5	1.23
Identifiable Aves		134	41.26	135	38.4	257	66.62
Indeterminate Aves		529	18.46	161	7.22	717	27.79
Total Aves		663	59.72	296	45.62	973	94.41
Serpentes	Snake	6	0.1	4	0.08	4	0.07
Total Reptile		6	0.1	4	0.08	4	0.07
Total		5139	5745	11,405	5771	10,101	8801

Fig. 3 Summary of %NISP of faunal remains from the three features

Fig. 4 Summary of %Biomass of faunal remains from the three features

Table 2 Age profiles for cattle based on epiphyseal fusion

	Feature	196		176		194	
Element	Age at fusion (mo)	Fused	Unfused	Fused	Unfused	Fused	Unfused
Early fusing							
Distal humerus	12–18	–	–	–	–	1	–
Distal scapula	7–10	1	–	1	–	1	–
Proximal Radius	12–18						
Acetabulum	6–10	1	-	–	–	–	–
Proximal metapodials	before birth	1	2	–	–	2	–
Proximal first and second phalanges	19–24	8		3	–	8	1
Total		11	2	4	0	12	1
Percentage		39.3%	7.1%	57.1%	-	66.6%	5.5%
Middle fusing							
Distal Tibia	24–30	1	1	–	1	–	–
Proximal calcaneus	36–42	–	–	–	–	–	–
Distal metapodials	24–36	2	2	–	–	2	–
Total		3	3	0	1	2	0
Percentage		10.7%	10.7%	-	14.3%	11.1%	–
Late fusing							
Proximal humerus	42–48	–	1	–	–	–	–
Distal radius	42–48	–	1	–	1	–	–
Proximal ulna	42–48	–	–	–	–	–	–
Distal ulna	42–48	–	–	–	–	–	–
Proximal femur	42	5	-	–	1	–	2
Distal Femur	42–48	–	1	–	-	–	–
Proximal Tibia	42–48	1	–	–	–	–	1
Total		6	3	0	2	0	3
Percentage		21.4%	10.7%	-	28.6%	–	16.7%
Total		20	8	4	3	14	4

at Mission Santa Clara as well as other Spanish Mission sites (Allen et al. 2009; Garlinghouse 2009; Kiel 2016).

Cattle age-at-death was estimated through the assessment of long bone fusion rates, considering the extent of fusion for diagnostic elements (Table 2). No mandibles with intact teeth were recovered from this assemblage. Starting with feature 196 (earliest occupation), the majority of the cattle bones (71%) are fused, suggesting death after 3.5 years of age. The high percentage of fused bones is due to the large number of phalanges that dominate the cattle assemblage for all three features. Unfused metacarpals, the only two early fusing elements identified (0.07%), suggest a neonatal calf was potentially consumed. During the second occupation (feature 176 1800–early 1820s), all identified long bone epiphyses ($n=3$) are unfused. This small sample size for which fusion can be assessed from feature 176 is most likely

a product of high rates of fragmentation, discussed below. The fusion rate of cattle bones dating to the final occupation (feature 194; early 1820s–36), indicates that people primarily consumed cattle between 2 and 3.5 years of age. The majority of the cattle bone are fused (78%), similarly due to the abundance of fused phalanges.

The small sample size from all three features for which age-at-death estimates could be made makes it difficult to reconstruct a demographic. Nevertheless, there appears to be a shift in ages from cattle older than 3.5 years (feature 196), to cattle aging between 2 and 3.5 years (feature 194). Zooarchaeological work conducted at other California missions indicates cattle were typically slaughtered around three years of age at both weekly slaughters and large *mantanzas* (Gust 1982; St. Clair 2005; Wessel 1980; Voss 2008:313). Generally, the killing of older cows in the beginning of the Mission Period most likely relates to efforts in sustaining herds of

Table 3 Mission Santa Clara butchery marks observed on large mammals (probable cow)

Body Part	Cut mark	Hack mart	Sawing mark	Spiral fracture	Unknown
Atlas	1	0	0	0	0
Axis	1	0	0	0	0
Cervical vertebra	13	0	0	0	0
Thoracic vertebra	32	1	0	0	0
Lumbar vertebra	23	1	0	0	0
Sacrum	1	0	0	0	0
Caudal vertebra	9	0	0	0	0
Uncertain vertebra	11	2	0	0	0
Rib fragments	112	3	13	0	0
Scapula	3	2	0	0	0
Humerus	0	0	0	0	0
Radius	1	0	0	0	0
Ulna	0	0	0	0	0
Carpals	2	0	0	0	0
Metacarpal	1	0	1	0	0
First phalanx	2	0	0	0	2
Second phalanx	1	1	0	0	2
Third phalanx	1	0	0	0	0
Innominate	4	1	0	0	0
Femur	5	1	1	1	1
Patella	1	0	0	0	0
Tibia	6	0	1	4	0
Calcaneum	3	0	0	0	2
Astragalus	2	0	0	0	1
Tarsals	3	0	0	0	0
Metatarsal	1	0	1	0	0
Long Bone Fragment	186	18	14	0	0
TOTAL	425	13	31	5	8

Fig. 5 Evidence of cut marks on rib and vertebral elements

Fig. 6 Evidence of a hack mark

cattle, which quickly became less important as cattle thrived in Santa Clara valley to the point where the culling of herds was required.

As diagnostic features on bones are often removed during dismemberment, the most common elements with evidence of butchery marks are unidentifiable mammal specimens (Pavao-Zuckerman and LaMotta 2007). On identified elements from each feature, cut marks are present on the majority of ribs, vertebrae, and

long bones, most likely produced by metal tools during the preparation of daily meals (Table 3) (Fig. 5). Eighteen elements display evidence of a hack mark, the majority of which are on forequarter and hindquarter elements, resulting from the dismemberment process (Fig. 6). Evidence of skinning is primarily found on rib and long bones, most likely produced by both stone and metal tools. A few bones also show signs of percussion blows that may have been caused by stone tools or at least non-metal tools, although the marks are indeterminate.

Only a small quantity of cattle bones shows any evidence of heat modification among all three features: 196 ($n=7$), 176 ($n=7$) and 194 ($n=16$). The color of each thermally altered bone was recorded using Munsell soil color charts (Munsell 2010). Additionally, there is very little evidence of animal gnawing with only six cattle bones from the entire combined assemblage displaying evidence of carnivore interference post mortem.

In order to assess changes in the portions of cattle consumed by Native Californians in their daily meals, analytical metrics of (1) skeletal completeness, and (2) food utility index (FUI) are cooperatively used. In the present study, element frequency data are used to assess the completeness of a skeleton along eight anatomical groupings: head (skull, mandible, teeth, atlas and axis vertebrae); axial (ribs and cervical, thoracic and lumbar vertebrae); forequarter (scapula, sternum, humerus, radius, and ulna); hindquarter (innominate, sacrum, femur, patella, and tibia); forefoot (carpal and metacarpals); hindfoot (tarsals and metatarsals); foot (metapodials, astragalus, calcaneus, sesamoids, and phalanges); and tail (caudal vertebrae).

Analysis of these data demonstrates clear temporal consistency in the cattle portions allocated to Indigenous families. According to the skeletal completeness for cattle, ribs/vertebrae category was the most numerous, with overall quantities

Fig. 7 Elemental distribution for cattle

of the bones increasing throughout the Mission Period (Fig. 7). This pattern aligns with previous work examining Native California diet within missions that reported high quantities of fragmented rib and vertebral elements relating to Spanish butchering practices (Allen 1998; Langenwaller and McKee 1985; St. Clair 2005). The body portions yielding the most meat (the hindquarter and the forequarter, in rank order, are under-represented in comparison. Although there is a slight chronological decrease in the portions with low food utility (i.e., tail, foot, and head), elements associated with these portions occurred in higher quantities than hindquarter/forequarter throughout the sequence.

The FUI is built from Binford's (1978) work on the economic utility of both sheep and caribou based on available meat, marrow, and grease from different body portions. In more recent years, this index was modified to assess primarily food-related economic utility or meat associated with each element. Due to biases common with NISP, NNISP was calculated with each element grouped into one of three categories: high utility elements, including the sternum, femur, tibia, patella, and tarsals; mid utility, which includes the vertebrae (except the atlas and axis), pelvis, sacrum, ribs, scapula, humerus, radius and ulna, and metatarsal; low utility elements, including the skull, mandible, teeth, atlas and axis, metacarpal and carpal, phalanges and caudal vertebrae (Metcalf and Jones 1988; Purdue et al. 1989).

The FUI index supports the skeletal completeness, revealing a consistency in the portions of cattle eaten throughout the entire Mission Period (Fig. 8). The only change present is a slight temporal decrease in low-utility items and an increase in middle-utility elements through the Mission Period. Importantly, the consumption of high-utility elements which include those associated with the highest quality and quantity of meat (i.e., femur) remains unchanged and low (Fig. 8).

Fig. 8 Food utility index (FUI) of cattle using normed NISP

Fig. 9 Survivorship and bone mineral density for cattle

Taphonomy and Fracture Freshness Index

To consider whether taphonomic processes including acidic soils, weathering, carnivore gnawing, trampling, and compaction of anthropogenic soils are responsible for the fragmentation of the assemblage, the effects of density-mediated attrition on cattle bones are evaluated (Lyman 1994). More porous bones which naturally break more easily are evaluated against denser bones that can better withstand the effects of nonhuman taphonomic processes. If density-mediated attrition has affected the assemblage, cattle elements with higher density values would be present in higher quantities than elements with lower density values. Using this technique, I compared previously calculated cattle-specific bone density values against percent survivorship of elements (Ioannidou 2003). Survivorship is determined by dividing MNE (minimum number of elements) values by expected MNE values given 100% survivorship. These values are plotted against cattle-specific bone mineral density (Fig. 9). If percent survivorship values correlate positively with density values, then fragmentation has been primarily structured by bone density; however, if a significant positive correlation is lacking, then we can rule out density-mediated attrition and shift our focus towards human causal factors. The Pearson's r correlation coefficients for features 196 ($r=0.01$), 176 ($r=-0.13$) and 194 ($r=-0.01$) indicate a lack of correlation, demonstrating bone fragmentation was not a product of natural taphonomic practices.

To further assess bone fragmentation, I turn to the Fracture Freshness Index (FFI). The FFI is a tool used to assess whether bones were fractured fresh or “green” by human activity through measurements of the fracture edge texture, outline, and angle on long bone shafts. Fresh bones break differently than older fragments; the

Fig. 10 Fracture freshness index scores for Feature 196

Fig. 11 Fracture freshness index scores for Feature 176

breakage of fresh bones results in a helical or spiral fracture at an acute or obtuse angle, as measured against the long axis of the bone. Older, drier bones that break due to taphonomic processes tend to fracture perpendicular to the cortical surface (Outram 2002). FFI scores of two or less indicate an assemblage's fracture pattern is

Fig. 12 Fracture freshness index scores for Feature 194

most attributable to fresh bones (Outram 2001:407). Following the guidelines established by Outram (2002), fracture estimates for solely cortical, long bone shaft fragments from each feature were calculated. For each of the three features, bones were scored on a scale from 0 to 6, with zero signifying a bone that was freshly fractured.

The FFI scores for each feature are unimodal, skewed left toward the lower values, indicating that the majority of the large mammalian bone fractured were freshly broken. Feature 196 (1777–1800) has the average highest FFI score of 2.2 with a distribution toward the lower numbers (Fig. 10). Feature 176 (1800–early 1820s) has the lowest FFI score of 1.9, with freshly fractured bone dominating the sample (Fig. 11). Finally, feature 194 (early 1820–36) has a similarly low average score of 2.1, with most bone fragments scoring a 2 or less (Fig. 12). These low FFI values suggest that the collective assemblage was minimally affected by taphonomic factors, and instead likely fragmented as a result of the purposeful fracturing of bones.

Table 4 Count (NISP) and weight of identifiable and unidentifiable mammalian faunal remains

Taxa	196		176		194	
	NISP	Weight	NISP	Weight	NISP	Weight
Identified Mammalia	691	15.46	349	3.83	1073	14.90
Indeterminate	3778	1209.12	10,756	3844.56	8064	2986.18
Total Assemblage	4469	1224.58	11,105	3848.39	9137	3001.09
Indeterminate Percentage	84.54%	98.74%	96.86%	99.90%	88.26%	99.50%

Table 5 Large and medium mammalian bone fragments by size

196			
Size	Indeter	LBF	Rib
< 30 mm	1989	564	299
> 30 mm	752	139	75
<i>Total</i>	<i>2741</i>	<i>703</i>	<i>374</i>
176			
Size	Indeter	LBF	Rib
< 30 mm	5479	2054	599
> 30 mm	1475	934	196
<i>Total</i>	<i>6954</i>	<i>2988</i>	<i>795</i>
194			
Size	Indeter	LBF	Rib
< 30 mm	3246	1175	415
> 30 mm	998	858	248
<i>Total</i>	<i>4244</i>	<i>2033</i>	<i>663</i>

Bone Fragmentation

Patterns of bone breakage shed light on the intensity of mammal bone processing. This spectrum includes cut marks indicative of butchering and chopping, the extraction of marrow indicated by a spiral fracture, and the intensive pulverization of bones to render grease. Assemblage indicative of marrow processing are composed of coarse shaft fragments, helical fractures from fresh bone breaks, and long bone epiphyses intact. Evidence of grease rendering includes high proportions of small bone fragments from epiphyses, axial elements, and long bone diaphyses (Outram

Fig. 13 Example of heavily fragmented mammalian remains

1998, 2001, 2002). Assemblages containing marrow processed and grease rendered elements will also have a low frequency of burning (Vehik 1977).

All three features contain a high quantity of heavily fragmented bone that cannot be identified beyond class (Mammalia). Though zooarchaeological assemblages often contain unidentifiable bone fragments, each feature contains notably high proportions. While 85% of mammalian bones from feature 196 (1777–1800s) and 88% from Feature 194 (early 1820–36) are unidentifiable, for feature 176 (1800–early 1820s) 97% of the assemblage is comprised of unidentifiable bone fragments (Table 4). Notably, mammalian bones are also significantly more fragmented than bird bones.

Table 5 displays the quantity of large mammalian bones maximum lengths, separated into size classes > 30 mm and < 30 mm (see Outram 2002). This includes indeterminate fragments for the which the element cannot be determined, long bone fragments (LBF), and rib fragments. For each feature, the small class size dominates, suggesting that the deliberate fragmentation of mammalian bones was consistent throughout the Mission Period (Fig. 13).

In terms of elements identified as cattle, from each feature, very few epiphyseal bone fragments survived. Feature 176 (1800–early 1820s) contains the lowest quantity of epiphyses, which similarly obscured the determination of cattle ages (see above). The distinctive spiral fracturing among cattle long bones indicative of marrow extraction is identified on five elements: a femur and tibia from feature 196 (1777–1800), one tibia from 176 (1800–early 1820s), and one tibia from feature 194 (early 1820–36) (Fig. 14).

Following Garlinghouse (2009) and the skeletal completeness categories outlined above, the percent completeness of cattle elements from each feature were assessed (Table 6). From feature 196 (1777–1800) nearly 60% of the bones are less than 25% complete. This statistic increases with feature 176 (1800–1820s) as 80% of the cattle bones are less than 25% complete. The fragmentation rate decreases once again with feature 194 (1820s–36) with 43% of cattle bones are less than 25% complete. Consistent through time and across features, vertebrae are the most frequently encountered elements having the highest fragmentation

Fig. 14 Example of spiral fracturing

Table 6 Element Distribution of cattle by percent completeness

196				
Element	0–25%	25–50%	50–75%	75–100%
Foot	3	0	1	8
Forefoot	4	0	0	3
Hindfoot	1	0	0	3
Tail	0	1	1	8
Forequarter	9	3	1	0
Hindquarter	10	2	0	0
Vertebrae/Rib	54	24	0	1
<i>Total</i>	<i>81</i>	<i>30</i>	<i>3</i>	<i>23</i>
Percentage	59.12%	21.90%	2.19%	16.79%
176				
Element	0–25%	25–50%	50–75%	75–100%
Foot	2	0	1	4
Forefoot	3	0	1	1
Hindfoot	0	0	0	0
Tail	0	1	0	4
Forequarter	6	0	0	0
Hindquarter	5	1	0	0
Vertebrae/Rib	43	2	0	0
<i>Total</i>	<i>59</i>	<i>4</i>	<i>2</i>	<i>9</i>
Percentage	79.73%	5.41%	2.70%	12.16%
194				
Element	0–25%	25–50%	50–75%	75–100%
Foot	0	1	1	12
Forefoot	3	0	0	2
Hindfoot	0	0	0	2
Tail	1	2	0	11
Forequarter	9	2	1	1
Hindquarter	4	3	0	1
Vertebrae/Rib	52	42	8	1
<i>Total</i>	<i>69</i>	<i>50</i>	<i>10</i>	<i>30</i>
Percentage	43.40%	31.45%	6.29%	18.87%

rates, with the majority of the bones less than 25% complete. Furthermore, the bone elements ranging between 75 and 100% in terms of completeness consistently derive from the lower leg, foot (phalanges) and tail; elements that yield little meat and marrow (Fig. 15).

Finally, as the practice of grease rendering includes the boiling of bones, low frequencies of burnt or calcined bones are expected in these assemblages. In the

Fig. 15 Evidence of unbroken lower limb bones (phalanges, astragalus, and carpals)

assemblages from each of the three features, less than 3% of cow remains show signs of burning. This low rate of burning indicates, alongside the fragmentation patterns, bones were primarily boiled, as opposed to being roasted over a fire which leads to higher rates of thermal exposure.

Interpretation of the Faunal Assemblage

The three feature contexts offer a diachronic perspective on Native Californian foodways within Mission Santa Clara, adding to a growing body of research focusing on daily diet within these colonial complexes. Although this assemblage from Mission Santa Clara is only a sample of the faunal material recovered from the site, conclusion concerning Native Californian diet can be drawn. As typical of Spanish mission sites in California, domesticates, specifically *Bos taurus*, dominate the assemblage and appear to have been the main source of meat throughout the Mission Period. This reliance on cattle is well documented at other missions within California, indicating the importance of beef in Native Californian diets (Bartel 1991; Farris 1991; Gust 2004, 2006; Langenwaller and McKee 1985; Panich et al. 2018; St. Clair 2005; Thompson 2003; Romani and Toren 1975). In regard to sheep and goat, however, there is a discrepancy in the paucity of caprine elements identified in the three refuse contexts as compared to mission records. This pattern, also identified at other California mission sites, has been attributed to the utilization of sheep for wool rather than meat. However, several researchers have also suggested this pattern is explained by Native Californian preference for beef rather than mutton

(Langenwalter and McKee 1985:102; St. Clair 2005). Although cattle contributed the greatest proportion of meat to daily meals, the continued presence of wild fauna alongside domestic taxa throughout the Mission Period indicates traditional food resources remained important for mission inhabitants. Despite the constraints on hunting imposed by both the mission boundaries and decline in native species following the introduction of agriculture, food-related and non-dietary wild mammals and birds continued to be procured and utilized.

The composition of the assemblage from the three midden features echoes previous work examining Native Californian diet within the *Ranchería* at Mission Santa Clara. An assemblage from a Native American house floor and pit/cache features analyzed by Garlinghouse (Allen et al. 2009:587), and a refuse feature analyzed by Kiel (2015) contain similarly high quantities of cattle, reinforcing their significance in daily meals eaten by Native Californians. Garlinghouse (2009) suggests that the abundance of cattle elements relative to wild species such as deer indicates that Native Californians supplemented their Spanish-style meals with traditional foods. This is supported by studies within California missions where traditional food resources have been identified within assemblages associated with Native Californian diet, while assemblages associated with Spanish soldier and Franciscan diets noticeably lack native species (e.g., Allen 1998; Gust 2004, 2006; Langenwalter and McKee 1985; Romani and Torren 1975).

Concerning the remains from large mammals and cattle, I identified three patterns within the Mission Period at Mission Santa Clara. First, the broad temporal pattern reveals that there is little change in the quality of cattle meat throughout the Mission Period at Santa Clara. Portions of cattle meat eaten by Native Californians were consistently limited to medium- and low-quality meat portions, with higher quality cuts markedly absent (also see Garlinghouse 2009 and Kiel 2016).

Second, the faunal evidence for stewing in each of three features is demonstrated by the abundance of fragmented ribs and vertebral elements. Ribs fragments specifically account for above 30% of elements identified from each feature, signifying their importance in daily meals throughout the Mission Period. Previous work conducted within the *Ranchería* at Mission Santa Clara highlights the high quantities of fragmented ribs and vertebral elements, indicating this pattern is not unique to these three features (Allen et al. 2009; Garlinghouse 2009; Kiel 2016). Elsewhere within Alta California, David Huselbeck's work at Mission Santa Cruz reported the most abundant elements able to be identified included rib and vertebral elements broken at weak points in the joints (Allen 1998). The analysis of faunal material associated with Native Californian housing at Mission San Juan Bautista and San Antonio similarly reveals high quantities of fragmented rib and vertebrae bones alongside smaller bones, including carpals, tarsals, and phalanges (Langenwalter and McKee 1985; St Clair 2005).

The high abundances of ribs and vertebral elements in contexts associated with food-related activities are the result of “Californio” butchering practices of cattle (St. Clair 2005:104). This practice of dividing the cattle carcass and stripping free the meat from the long bones to be dried as jerky was the same regardless of whether it was a small weekly slaughter or large seasonal *mantanza*. Analysis by Gust (1982) at the Ontiveros Adobe characterized *mantanza* butchering sites as containing high

quantities of whole or partially articulated carcasses and lacking ribs and vertebrae. This is reaffirmed by analyses of *mantanza* sites at Mission Santa Clara (Burson 1999) as well as at the Peralta Adobe (Smith-Lintner 2007) who found similar patterning their assemblages. As ribs with attached vertebrae could not easily be stripped of their meat, these elements were transported to the mission to be used in colonial-style meals of *atole* and *pozole* rather than discarded at the butchery site. From their analysis, Langenwalter and McKee (1985) suggest the lower limbs of cattle, including carpals, tarsals and phalanges that adhere to meat tissues were also back to the mission by Native Californians to be included in soups and stews.

Third, mammalian bones from each of the three features were fractured through purposeful human activity related to daily dietary practices of Native Californians. Within Mission Santa Clara, the locations of the tannery, primary butchery locations, and *mantanza* site outside of the boundaries of the *Ranchería* imply that the bone fragmentation patterns are unlikely to be related to the acquisition of hide and tallow. As previously detailed, assemblages from butchery locations and *mantanza* sites contain whole, unbroken carcasses of cows and lack vertebral and rib elements (Burson 1999). After the hide was removed from the carcass, cattle were taken to a secondary processing area for the removal of fat to be rendered into tallow. Assemblages from tallow production locations contain almost unidentifiable solely fragments from large mammals with all elements shattered to access the tallow while lacking additional food-related species (Wessel 1980). The location of the communal refuse pits within the *Ranchería* and plethora of additional food related items within these features indicate that the fragmentation pattern is attributable to daily foodway practices of marrow extraction and grease rendering.

High occurrences of bone fragmentation and spiral fractures indicative of marrow extraction have been previously identified at Missions Santa Clara (Garlinghouse 2009), Santa Cruz (Allen 1998), San Buenaventura (Romani and Torren 1975:397), San Luis Obispo de Tolosa (Gust 2006), and San José (Thompson 2003:112) with researchers noting the continuation of traditional Native Californian bone processing within this colonial setting. Highly fragmented remains from the Mission San Juan Bautista and San Antonio de Padua assemblages are mentioned but never addressed, with the analysts only stating that the cut marks on rib elements are from the butchering of the cow carcass rather than marrow extraction (Langenwalter and McKee 1985; St. Clair 2005). In the assemblages from Mission Hylkema Santa Clara, both Garlinghouse (2009) and Kiel (2016) emphasize high fragmentation of their assemblages, stating the majority of bones could not be identified except to the general taxonomic levels. Although grease rendering and marrow extraction are documented as fairly common processing activities among prehistoric Native Californians, these practices are not yet well- documented in the historic period in Alta California.

Grease Rendering, Marrow Extraction, and Stew-Making

Two reliable sources of nutritious fat are stored within bones themselves, marrow which exists within the bone cavity, and grease that is contained within the spongy cancellous material (Outram 2002). The extraction of marrow requires a single

break known as a spiral fracture, though additional breaks of long bones can yield higher quantities. Different elements contain differing concentrations of bone marrow, with yield varying by species, element, and portion (Lupo 1998). Following the removal of marrow, grease rendering using traditional methods is a time and labor-intensive process (Pavao-Zuckerman 2011). First, cancellous bone is broken, occasionally pulverized, into fragments < 5 cm. (Church and Lyman 2003; Lupo and Schmitt 1997; Morin 2020; Saint-Germain 1997). The fragments are then boiled, the liquid is left to simmer from 3–8 hr, and the grease is skimmed from the surface. This grease can also be used within stews, with additional ingredients incorporated into the grease infused broth (Church and Lyman 2003; Jackson and Scott 2003; Kent 1993; Yellen 1977). This process of grease extraction is far easier as long-simmering stews can be left unattended for extended periods, allowing for other responsibilities to be attended to while meals are cooked (Heinrich 2014; Samford 1996).

Fats derived from bones are calorically dense, providing a dependable source of concentrated energy and essential nutrients (Church and Lyman 2003; Janzen et al. 2014; Leechman 1951; Outram 2001). Ethnographic and archaeological data have demonstrated the importance of the exploitation of bone grease and marrow for populations experiencing dietary stress, justifying the addition time and labor required (e.g., Binford 1978; Heinrich, 2014; Outram, 1999, 2001, 2003). Indeed, the extraction of marrow and grease are often examined in assemblages dating to known times of environmental or climatic disruptions and used to confirm dietary stress. In such assemblages, elements are heavily chopped, shattered, and boiled, the laborious process necessary to extract every last nutrient from animal carcasses (Dixon et al. 2010). Apart of dietary stress, marrow and grease extraction are also common practices amongst hunter-gatherer populations aiming to maximize the caloric return rate (Binford 1978; Jochim 1981; Leechmen 1951; Logan 1998; Peale 1871; Speth and Spielmann 1983; Vehik 1977; Zierhut 1967). As such the presence of heavily fragmented remains in archaeological assemblages associated with hunter-gatherers can be indicative of a routinized behavior rather than a response to malnutrition or starvation (Speth and Spielmann 1983).

Binford's (1978:161) work with the Nunamiut was one of the first to document the decision-making behind grease and marrow extractions. While much of this work is in regard to the selectivity of carcass transportation, he found that elements with marginal amounts of marrow and grease (e.g., metacarpals, metatarsals, carpals, tarsals, and phalanges) were found to have only been processed during times of nutritional and dietary stress (Jin and Mills 2011; Morin 2007). The systematic fracturing of elements associated with low quality grease alongside the processing of the higher-utility bones has thus been used as an indicator of potential starvation (Binford 1978; Jin and Mills 2011). In this assemblage from Mission Santa Clara, lower limb bones from each of the three features consistently remain > 75% complete with no evidence of intentional breakage of metacarpals, metatarsals, nor phalanges (see Table 6 and Fig. 15). Indeed, marrow and grease were extracted almost exclusively from the few medium and high-utility long bones with the highest quantities of marrow and grease.

Rather than an indicator of dietary stress, this zooarchaeological analysis indicates that throughout the Mission Period, Native Californians fractured mammalian

bones to extract marrow and grease to enrich a broth while cooking cattle meat in Spanish-style stews. Previous syntheses disagree on the quantity and quality of the Native Californian diet within the mission system. Some scholars state that the mission diet was deficient, and Native people used wild species to augment their diet (Cook 1976; Farris 1991) while others argue that wild foods were a luxury item (Huelsbeck 1983). However, it must be remembered that agricultural production varied greatly between missions and while they shared much in common, sweeping generalizations cannot be made. Mission Santa Clara was one of the most productive Californian missions, with vast herds of cattle that required culling, leaving large quantities of beef that was reportedly discarded and left to rot (Duhaut-Cilly 1999). The plethora of wild food resources acquired by Native California's throughout the Mission Period alongside the fragmentation pattern of cattle bones suggests the extraction of grease was not a response to starvation (Garlinghouse 2009; Kiel 2016).

The extraction of grease and marrow are considered widespread practices amongst hunter-gatherers, and Native Californians were no exception (Driver 1939:315; Harrington 1942:9; Jones 1992; Voegelin 1942: 59; Wake 1997). In the San Francisco Bay area and San Joaquin Valley, analyses of large terrestrial mammals confirms deer and elk remained key sources of protein in the Late Period, just before the arrival of the Spanish. Studies have identified distinct evidence for both marrow and grease extraction from deer and elk remains throughout Native Californian prehistory (see Broughton 1999:64; Cuthrell 2013; Dylla 2017; Fenenga 1952; Gerow and Force 1968: 32; Hylkema and Cuthrell 2013; McHenry 1968; Mora 2020; Whitaker 2012: 58; Wake 2012: 14).

Within the area surrounding the San Francisco Bay, located in traditional Ohlone territory, evidence of grease extraction has been well documented at prehistoric sites (Broughton 1999:64; Sunseri 2009, 2015). On the eastern shore of San Francisco Bay, the sacred site of the Ohlone people named Emeryville Shellmound contained high concentrations of food remains. Examination of the highly fragmented mammalian bones concluded the consistent extractions of marrow and grease from large mammalian bones throughout the occupations of the site, 2600 to 720 BP (Broughton 1999:64). Within Santa Clara Valley and Santa Cruz, analyses of faunal assemblages associated with prehistoric villages have similarly revealed a patterning of the grease and marrow extraction. The assemblages from both village sites date to the Middle Period (600 BCE–1000 CE) and Middle-Late Transition (MLT, 1000–1250 CE) which coincides with the Medieval Climatic Anomaly, a known period of dietary stress (Sunseri 2009, 2015). While there is a high degree of fragmentation in assemblages from both time periods, there is a shift in processing intensity during the later period of climatic stress, demonstrated by increased fragmentation rates of deer and elk elements. These studies demonstrate native rendering occurred throughout prehistory, amidst both favorable and adverse climates. Notably, the assemblage from the three features at Mission Santa Clara align with the faunal patterning from the assemblages associated with productive environmental conditions.

Within Alta California Missions, all inhabitants consumed versions of *atole* in the morning and evening and *pozole* at midday. Reports list the ingredients for these

meals, detailing the inclusion of corn, wheat, beans, and meat within a water-based soup (Geiger and Meighan 1976:86). References in the historical and ethnographic literature from missions, presidios, and pueblos regarding the daily meals of the Spanish soldiers and Franciscan padres make no mention of the use of bone marrow and grease. Instead, the addition of cuts of meat to boiling water is specified, suggesting grease-infused broth was not a specialized step in the Spanish preparation of *atole* and *pozole* (Geiger and Meighan 1976:86; Hardwick 2015: 63–64; St. Clair 2005).

Assemblages associated with the Spanish and padres' quarters at Mission Santa Ins and La Pursima reports low frequencies of elements associated with low-quality cuts of meat, while ribs and vertebrae reportedly dominate the assemblage (Gust 2004; Walker and Davidson 1989). This aligns with work at Mission San Juan Bautista where assemblages associated with Spanish and padres, and Native Californian diet both contained high frequencies of ribs and vertebrae and compared to other elements (St. Clair 2005). While these analyses demonstrate ribs and vertebral elements were the main component in *pozole* for both colonists and Native Californians, analyses concerning whether grease and marrow were included in the Spanish and padres' daily meals have yet to be investigated at Mission Santa Clara. Notably, however, the assemblages associated with the Spanish soldiers and Franciscan padres at Missions Santa Ins, La Pursima, and San Juan Bautista report low frequencies of unidentifiable mammalian bone, suggesting grease was not included in their daily stews. Forthcoming analyses will clarify if bone grease and marrow were indeed included in the stews of the Spanish and Franciscan padres.

Current evidence suggests that despite the colonial structure of Mission Santa Clara, Native Californians prepared, and cooked Spanish-style stews using traditional processing techniques and past knowledge of how to prepare and consume mammalian bone. It is important to recognize daily activities as practices that are continuously reshaped and rearticulated within changing circumstances (Silliman 2009; Panich 2013). Change and continuity are not mutually exclusive concepts, and instead daily practices must be understood as ongoing processes (Silliman 2009). Within and despite the constrictions of the mission system, Native families within the *Ranchera* retained autonomy over many aspects of their daily life, with practices related to daily meals a venue for these choices. The three daily meals consisting of restricted ingredients eaten at mealtimes specified by the Spanish was an integral part of a system of aimed at enculturation to restructure Native Californian daily life and worldviews (Lightfoot 2005; Milliken 1995). Yet within this rigid colonial context, Native Californians continued their traditional processing techniques of grease and marrow extraction, maintaining native foodways embedded within daily cooking practices. The extraction of grease and marrow represents a rearticulation and continuation of a traditional practice rather than complete shift and acceptance of Spanish foods and diet.

Commensality

The contexts of food preparation and consumption are often more significant than the food itself, specifically in the creation of a “commensal space” (Pollock 2012). The framework of commensality, defined as the creation and solidification of social relationships through the shared action of eating and drinking, is essential in understanding the daily dietary practices of Native Californians (Pollock 2012; Sobal and Nelson 2003). Commensality has been used to assess the social rules of eating, as they are governed and shaped, primarily during times of social upheaval (Grignon 2001). The social rules of communal eating are shaped by contextual, cultural circumstances with the creation and reaffirmation of bonds through the daily, domestic, routinized food practices (Mills 2007). Although commensality is often associated with feasting and the production of symbolic power, recent research has focused on the importance (and often overlooked) sociality of preparing and eating daily meals together (Pollock 2012). The repetitive actions that comprise quotidian life are the medium through which social relations are maintained, formed, and reproduced.

Ethnographic reports have detailed the spatial layout of the *Ranchería*, describing an enclosed square reserved for large furnaces and cauldrons. Within this square, Native Californians women communally prepared, cooked, and consumed daily stews, ingredients for atole and *pozole* were cooked in large communal pots and shared amongst all who lived within the *Ranchería* (Kotzbue 1830: 95–96; Pinedo 1934:9–10). Rather than food reserved for each individual family, these meals encouraged the widespread allocation of resources, shared responsibility of food preparation and cooking, and the communal consumption of the daily meals. Before the arrival of the Spanish, both male and female Native Californians participated in food procurement and preparation with men, primarily hunting and fishing, while women and children collected seeds, nuts, and greens (Geiger and Meighan 1976; Jacknis 2004). While many of these meals were prepared and eaten by individual families, the sharing of meals was an inherent aspect of many Native Californian social relations that continued into the colonial period (Geiger and Meighan 1976; Jacknis 2004).

Eating habits are equally important as the food consumed. Within the *Ranchería*, it was not the meals eaten but rather the communal space for food preparation and consumption that gave daily meals meaning. The continuation of this communal practice has been documented throughout the Mission Period, even following the integration of Native Californians from different sociolinguistic groups into the Mission Santa Clara, creating a novel pluralistic community (Peelo 2011). These daily meals forged connections between people, thus maintaining and rearticulating the distinction between Ohlone, Yokut speakers and Miwok people, and the Spanish soldiers and Franciscans who witness the daily meal (Duhaut-Cilly 1999:2:237; Langsdorff 1814; Pinedo 1934:9–10). Though these meals were mundane and consisted mainly of colonial-imposed food resources, the use of traditional culinary practices and collective consumption would have shaped and maintained community identities and bonds.

It is important to note that the utilization and acceptance of a foreign culinary activity within circumstances of coercion and pressure, or mere practicability,

does not correlate with the pervasive idea that Native Californians have “lost” their cultures and identities (Dietler 2010; Rubertone 2000). Identity is fluid and negotiated, and changes in practices do not equate to social and cultural cleavage (Lightfoot et al. 2005; Meskell 2002; Mullins 2004; Panich 2010; Silliman 2004; Voss 2008). As such, the traditional preparation and shared consumption of Spanish-style stews highlights how certain alien practices may be used to negotiate, create, and sustain multi layered social relations within a colonial setting. For newcomers to the mission, the sharing of the food preparation and cooking using traditional and colonial culinary practices likely created new communal and cohesive social relationships (Lightfoot 2015). Regardless of the acceptance or rejection of colonial food resources, these meals were given different meanings from the Spanish, and instead, this practice was integrated into preexisting social and cultural values. The *Ranchería* became a place of daily gathering where a network of relations among different groups of people, forming a nexus which would have helped foster community cohesion within this hierarchical and pluralistic colonial complex.

Conclusion

This zooarchaeological study is a first step in assessing Native Californian diet within Mission Santa Clara, focusing specifically on traditional processing methods and consumption behaviors. While beef was the main component in daily meals, future studies of Spanish-style meals need to be assessed not as evidence of passivity or social cleavage, but rather continuations and rearticulation of precontact practices within this colonial setting. As previously stated, eating habits are equally important as the food consumed. Foodways are one of the most persistent traditional activities retained during moments of social turmoil (Minz and DuBois 2002). The importance of daily foodways in this colonial mission settlement stems not from the consumption of cattle meat, but rather from the processing practices and commensality of daily meals (Brooks 2008).

This article joins previous work conducted by Garlinghouse (2009) and Kiel (2016), expanding our understanding of daily dietary practices of missionized Native Californians within Mission Santa Clara while raising additional questions. First, while high quantities of fragmented mammalian remains have been reported from numerous features associated with Native Californian foodway practices, the extraction of grease has yet to been investigated. This dearth of information accompanied by the lack of analyses conducted on assemblages associated with the Spanish quarters renders our understanding of Native Californians daily diet limited. Additional work focused specifically on the consumption of cattle and retention of traditional practices within the mission complex is required.

Zooarchaeological research at both within Mission Santa Clara and additional Alta California missions has both reaffirmed and challenged the limiting nature of this mission system. Through leaves called *paseos*, Native Californians were allowed to leave the mission boundaries and return to their former lands where they were also able to acquire traditional, wild food resources (Guest 1983; Peelo

and Blackmore 2011). Previous work within the *Ranchería* somewhat differs in the significance of traditional food resources, stating either wild species did not play a significant role in the overall diet (Garlinghouse 2009) or regardless of the caloric significance, wild foods served to maintain essential social and economic traditions (Kiel 2016). Though not the focus of this current study, future investigations into wild food sources that were eaten alongside daily Spanish-style meals will broaden our understanding of the full spectrum of indigenous diet within this complex colonial system.

Finally, the heavy fragmentation of mammalian bones does not change between the three features analyzed in this study, indicating that grease and marrow were used as a base for the broth of soups and stews throughout the Mission Period. The increase in the fragmentation of cattle bones from feature 176 (1800–20) as compared to in the preceding and subsequent occupations (feature 196 and 194, respectively) is difficult to fully parse out. One possible explanation relates to the increased population density at the beginning of the nineteenth century. Following the recruitment of Yokut-speaking people, the Native Californian mission population expanded from a couple hundred to ~1200–1300. However, census records indicate that population density remained consistently high until 1836, when the mission was secularized. Feature 194 (1820–36) has decreased rates of bone fragmentation, suggesting that the increase in population cannot solely account for the intensification of grease rendering.

The years from 1777 through to 1821 are denoted the Spanish Years with Spain continuing to exert control over the missions in Alta California. The Mexican War of Independence resulted in Mexico's ceding from Spain in 1821, thus initiating the Mexican Years (1821–36) as this new state acquired Alta California and the expansive mission system. At Mission Santa Clara, the years 1800–20 associated with feature 176 date directly to the years before this shift in power. This transfer of power, however, has been documented to have caused little change, with Father Català explicitly refusing to take an oath of allegiance to the newly formed Mexican state (Engelhardt 1909:244). Despite the complete transference of authority from Spain to Mexico, the dietary situation of Native Californians living within Mission Santa Clara largely remained the same with marrow and grease continuing to have been acquired and used as a broth. Faunal analyses focusing on features specifically dating to the early and middle mission years and Spanish years have yet to be completed. Additional analyses will advance our understanding of both the impact of increased population at Mission Santa Clara and change in daily diet following the shift of power from Spain to Mexico.

Foodways are a critical component of the colonial experience. The degree to which food-related activities imbued with culturally specific meanings shift and reorganize within colonial settings sheds light on impact of colonialism on local populations, advancing our understanding of key social negotiations, and cultural continuity and change. Past scholarship in Alta California used evidence of Spanish material in Indigenous contexts to confirm the unidirectional adoption of European goods and practices by Native American people, cultivating the misconception of the complete loss of traditional lifeways, and the dominance of the Spanish socio-economic system. This article joins a growing body of literature proving the falseness

of these assumptions, unraveling the uncritical classification of objects as either representing continuity or change, colonial or traditional. While this research is conducted with the explicit acknowledgement of the terrible demographic and ecological impact of the Spanish colonization, archaeological work within Alta California and more broadly colonial sites in North America are poised to challenge past terminal narratives and instead reinforce the persistence of native peoples who endured long after the mission system ended.

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Declarations

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